SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-42

Name: North Island Lake **Counties**: Minnehaha, McCook
Legal Description: T104N-R 52W-Sec. 19, T104-R 53-Sec 24-25
Location from nearest town: 10 miles west of Colton, SD

Dates of present survey: July 13-15, 2009
Dates of last survey: July 16-18, 2007

Primary Game Species	Other Species
Walleye	Northern Pike
Yellow Perch	Black Crappie
Largemouth Bass	Green Sunfish
	Black Bullhead
	Bluegill
	Smallmouth Bass
	Common Carp
	Muskellunge

PHYSICAL DATA

Surface area: 375 acres **Watershed area:** Unknown acres
Maximum depth: 17 feet **Mean depth:** 13 feet
Volume: 4,922 acre-feet **Shoreline length:** 4.4 miles
Contour map available: Yes **Date mapped:** 1997
Lake elevation observed during the survey: Full
Beneficial use classifications: (5) Warmwater semi-permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation, (9) fish and wildlife propagation, recreation and stock watering.

Introduction

Island Lake is a natural lake that lies on the McCook/Minnehaha County line. It was named for the numerous islands present during lower water years. County Highway 110 divides the lake into two sections that are managed separately and named North and South Island lakes. Culverts underneath the road used to allow fish passage between the lakes but we believe they were covered by rock when the road was raised in the mid-90's. Island Lake has a small, local watershed with no inlet or outlet streams. It is one of the few lakes in eastern South Dakota that has not been populated by common carp.

Ownership of Lake and Adjacent Lakeshore Properties

North Island Lake is not meandered public water. The South Dakota Department of Game, Fish and Parks (GFP) and the United States Fish and Wildlife Service (USFWS) share ownership of most of the lake basin and surrounding shoreline. The extreme northeast, southwest and northwest portions of the lake are privately owned.

Fishing Access

The North Island Lake Access Area is currently in poor condition. High water levels have eroded much of the shoreline and the boat ramp is entirely under water. Small boats can still be launched but parking is limited. Shore fishermen frequently park along the county road to fish. Some shore fishing is available on the USFWS land on the north end of the lake.

Field Observations of Water Quality and Aquatic Vegetation

The water in North Island Lake was very clear during the survey with a Secchi depth measurement of 1.8 meters (72 in). There were large beds of sago pondweed (*Potamogeton pectinatus*) and clasping leaf pondweed (*Potamogeton richardsonii*) around the entire lake. There is some cattail (*Typha spp.*) and bulrush (*Scirpus spp.*) in the bays on the north end of the lake.

BIOLOGICAL DATA

Methods:

North Island Lake was sampled on July 13-15, 2009 with four overnight gill-net sets and ten overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh (¾ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting. Sampling locations are displayed in Figure 3.

Results and Discussion:

Gill Net Catch

Walleye (50.0%), black bullhead (38.0%) and smallmouth bass were the only species sampled in the gill nets (Table 1).

Table 1. Total catch from four overnight gill net sets at North Island Lake, Minnehaha County, July 13-15, 2009.

Species	Number	Percent	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Walleye	25	50.0	6.3	±1.9	5.3	16	4	94
Black Bullhead	19	38.0	4.8	±4.0	104.5	26	0	112
Smallmouth Bass	6	12.0	1.5	±0.8	0.3	--	--	--

* 5 years (1999, 2001, 2003, 2005, 2007)

[1] See Appendix A for definitions of CPUE, PSD, and mean Wr.

Table 2. Catch per unit effort by length category for various fish species captured with gill nets in North Island Lake July 13-15, 2009.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Walleye	--	6.3	5.3	0.7	0.3	6.3	±1.9
Black Bullhead	--	4.8	3.5	1.3	--	4.8	±4.0
Smallmouth Bass	--	1.5	0.7	0.5	0.3	1.5	±0.8

*No length categories established. Length categories can be found in Appendix A.

Trap Net Catch

Black bullheads (91.7%) were the most common species sampled in the trap nets (Table 3). Bluegill, common carp, walleye, green sunfish, northern pike, black crappie, hybrid sunfish, and white sucker were also sampled.

Table 3. Total catch from ten overnight trap net sets at North Island Lake, Minnehaha County, July 13-15, 2009.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	1,390	91.7	139.0	±159.3	360.6	12	0	101
Bluegill	95	6.3	9.5	±9.8	0.7	23	6	117
Common Carp	10	0.7	1.0	±0.9	0.0	100	70	128
Walleye	10	0.7	1.0	±0.7	0.9	40	10	91
Green Sunfish	5	0.3	0.5	±0.3	1.4	--	--	--
Northern Pike	2	0.1	0.2	±0.2	0.6	--	--	--
Black Crappie	1	0.1	0.1	±0.1	0.0	--	--	--
Hybrid Sunfish	1	0.1	0.1	±0.1	0.0	--	--	--
White Sucker	1	0.1	0.1	±0.1	0.1	--	--	--

* 5 years (1999, 2001, 2003, 2005, 2007)

Table 4. Catch per unit effort by length category for various fish species captured with trap nets in North Island Lake July 13-15, 2009.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Black Bullhead	50.3	88.7	77.8	10.9	--	139.0	±159.3
Bluegill	0.2	9.3	7.2	1.5	0.6	9.5	±9.8
Common Carp	--	1.0	--	0.3	0.7	1.0	±0.9
Walleye	--	1.0	0.6	0.3	0.1	1.0	±0.7
Green Sunfish	--	0.5	0.5	--	--	0.5	±0.3
Northern Pike	--	0.2	0.2	--	--	0.2	±0.2
Black Crappie	0.1	--	--	--	--	0.1	±0.1
Hybrid Sunfish	--	--	--	--	--	0.1	±0.1
White Sucker	--	0.1	--	--	0.1	0.1	±0.1

*No length categories established. Length categories can be found in Appendix A.

Walleye

Management objective: Maintain a walleye fishery with a gill-net CPUE of at least 15 and PSD range of 30-60.

Walleye gill-net CPUE remained far below the management objective and the fish sampled ranged in length from 26 to 57 cm (10.2-22.4 in.) with an average length of 35.2 cm (13.8 in.). We believe summer gill nets may not be as effective for sampling walleyes in North Island Lake and that spring trap netting may be needed to more accurately assess the population. Walleyes grow quickly with fish exceeding 35.6 cm (14 inches) by age-3 (Table 6).

Table 5. Walleye gill-net CPUE, PSD, RSD-P, and mean Wr for North Island Lake, Minnehaha County, 1999-2009.

	1999	2000	2001	2002	2003	2004	2005	2007	2008	2009	Mean*
CPUE	8.0		8.0		1.0		3.8	5.8		6.3	5.3
PSD	0		70		--		53	0		16	31
RSD-P	0		15		--		40	0		4	14
Mean Wr	90		92		--		81	89		94	88

*5 years (1999, 2001, 2003, 2005, 2007)

Table 6. Weighted mean length at capture (mm) for walleye captured in gill nets in North Island Lake Minnehaha County, 2005-2009. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size in parentheses.

Year	1	2	3	4	5	6	7	8	9	10	11	12
2009	270	351	454	--	--	--	--	575	--	--	--	--
	(5)	(17)	(2)					(1)				
2007	245	330	--	--	--	--	--	--	--	--	--	--
	(22)	(1)										
2005	279	379	--	--	490	529	608	--	631	--	--	--
	(5)	(3)			(1)	(1)	(1)		(4)			

Yellow Perch

Management objective: Maintain a yellow perch fishery with a gill-net CPUE of at least 25.

Yellow perch abundance has decreased steadily since 2001 (Table 7). No perch were sampled in North Island Lake in 2009. The 2007 spring stocking of 3,420 juvenile perch (Table 10) did not increase gill net CPUE (Table 7). Yellow perch were stocked again in the fall of 2009.

Table 7. Yellow perch gill-net CPUE, PSD, and mean Wr for North Island Lake, Minnehaha County, 1999-2009.

	1999	2000	2001	2002	2003	2004	2005	2007	2008	2009	Mean*
CPUE	80.0		140.2		57.5		9.3	3.5		0.0	58.1
PSD	16		39		20		68	7		--	30
RSD-P	7		7		6		3	7		--	6
Mean Wr	118		108		106		109	112		--	111

*5 years (1999, 2001, 2003, 2005, 2007)

Black Bullhead

Management objective: Maintain a black bullhead population with a trap-net CPUE of 100 or less.

Black bullhead trap-net CPUE is the lowest since 1993, however, it continues to exceed the management objective (Table 8) and the fish have an average length of only 169 mm (6.7 in.). The length-frequency histograms (Figure 2) reflect the cyclic nature of the population.

Table 8. Black bullhead trap-net CPUE, PSD, and mean Wr for North Island Lake, Minnehaha County, 1999-2009.

	1999	2000	2001	2002	2003	2005	2007	2008	2009	Mean*
CPUE	598.1		345.9		214.4	256.0	388.5		139.0	301.1
PSD	96		53		32	48	18		12	42
RSD-P	0		7		12	3	3		0	5
Mean Wr	--		--		84	100	104		101	100
Mean Length					196	227	173		169	212

*5 years (1999, 2001, 2003, 2005, 2007)

All Species

Bluegill and largemouth bass were introduced in 2003 to take advantage of improved habitat conditions (Table 9). More small bluegills were sampled in 2009 (Figure 1). Smallmouth bass were introduced in 2007 because of abundant crayfish and ideal habitat conditions. Muskellunge were introduced in 2009 to create trophy angling opportunities.

Table 9. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in North Island Lake, Minnehaha County, 2001-2009.

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009
COC (GN)	--		--		--		--		--
COC (TN)	--		--		--		0.1		1.0
WHS (GN)	--		--		--		--		--
WHS (TN)	--		--		0.4		0.1		0.1
BLB (GN)	43.0		220.0		83.0		35.8		4.8
BLB (TN)	345.9		214.4		256.0		388.5		139.0
NOP (GN)	0.2		--		--		--		--
NOP (TN)	0.1		0.4		1.9		0.3		0.2
GSF (GN)	--		--		0.3		0.8		--
GSF (TN)	2.1		0.7		--		3.8		0.5
BLG (GN)	--		--		0.3		--		--
BLG (TN)	--		--		2.9		0.4		9.5
SMB (GN)	--		--		--		1.5		1.5
SMB (TN)	--		--		--		0.8		--
LMB (GN)	--		--		--		--		--
LMB (TN)	--		--		0.1		--		--
YEP (GN)	140.2		57.5		9.3		3.5		--
YEP (TN)	39.9		4.3		0.2		0.4		--
WAE (GN)	8.0		1.0		3.8		5.8		6.3
WAE (TN)	0.8		0.3		2.3		0.8		1.0

COC (Common Carp), WHS (White Sucker), BLB (Black Bullhead), NOP (Northern Pike), GSF (Green Sunfish), BLG (Bluegill), SMB (Smallmouth Bass), LMB (Largemouth Bass), YEP (Yellow Perch), WAE (Walleye).

MANAGEMENT RECOMMENDATIONS

1. Continue to conduct biennial lake surveys to monitor the fishery. Attempt a spring trap netting survey to sample the walleye population and compare the results with summer gill nets samples. Recommend a walleye sampling strategy based on the results of the comparison.

2. Manage black bullhead density by maintaining predator abundance and using intensive netting removals if needed.

3. Investigate the possibility of improving the access area.

4. Monitor the muskellunge population with short term gill net sets in late April.

Table 10. Stocking record for North Island Lake, Minnehaha County, 1995-2009.

Year	Number	Species	Size
1995	25,780	Yellow Perch	Fingerling
1996	27,000	Walleye	Fingerling
1997	28,800	Walleye	Fingerling
	2,690	Yellow Perch	Fingerling
1998	25,000	Walleye	Fingerling
	1,243	Yellow Perch	Adult
	18,590	Yellow Perch	Fingerling
1999	25,000	Walleye	Fingerling
	1,065	Yellow Perch	Adult
	2,522	Yellow Perch	Juvenile
2000	13,380	Yellow Perch	Juvenile
2003	26,650	Bluegill	Fingerling
	44,010	Largemouth Bass	Fingerling
2004	1,248	Bluegill	Adult
	25,010	Largemouth Bass	Fingerling
	294	Northern Pike	Adult
	410	Walleye	Juvenile
2005	45,100	Walleye	Fingerling
	25,317	Yellow Perch	Fingerling
	77	Yellow Perch	Adult
2007	164	Smallmouth Bass	Adult
	3,224	Walleye	Large Fingerling
	3,420	Yellow Perch	Juvenile
2008	164	Smallmouth Bass	Adult
	28	Smallmouth Bass	Juvenile
2009	8,748	Walleye	Large Fingerling
	620	Yellow Perch	Fingerling
	310	Yellow Perch	Adult
	145	Muskellunge	Juvenile

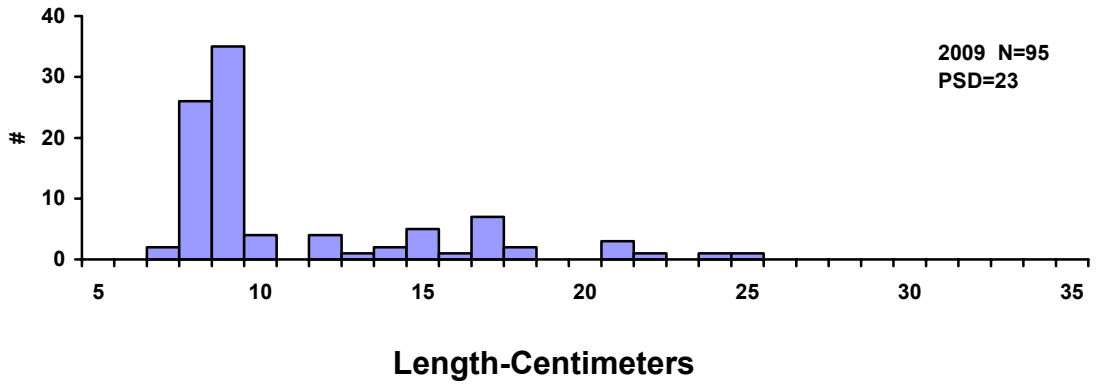

Figure 1. Length frequency histogram for bluegill sampled with trap nets in North Island Lake, Minnehaha County, 2009.

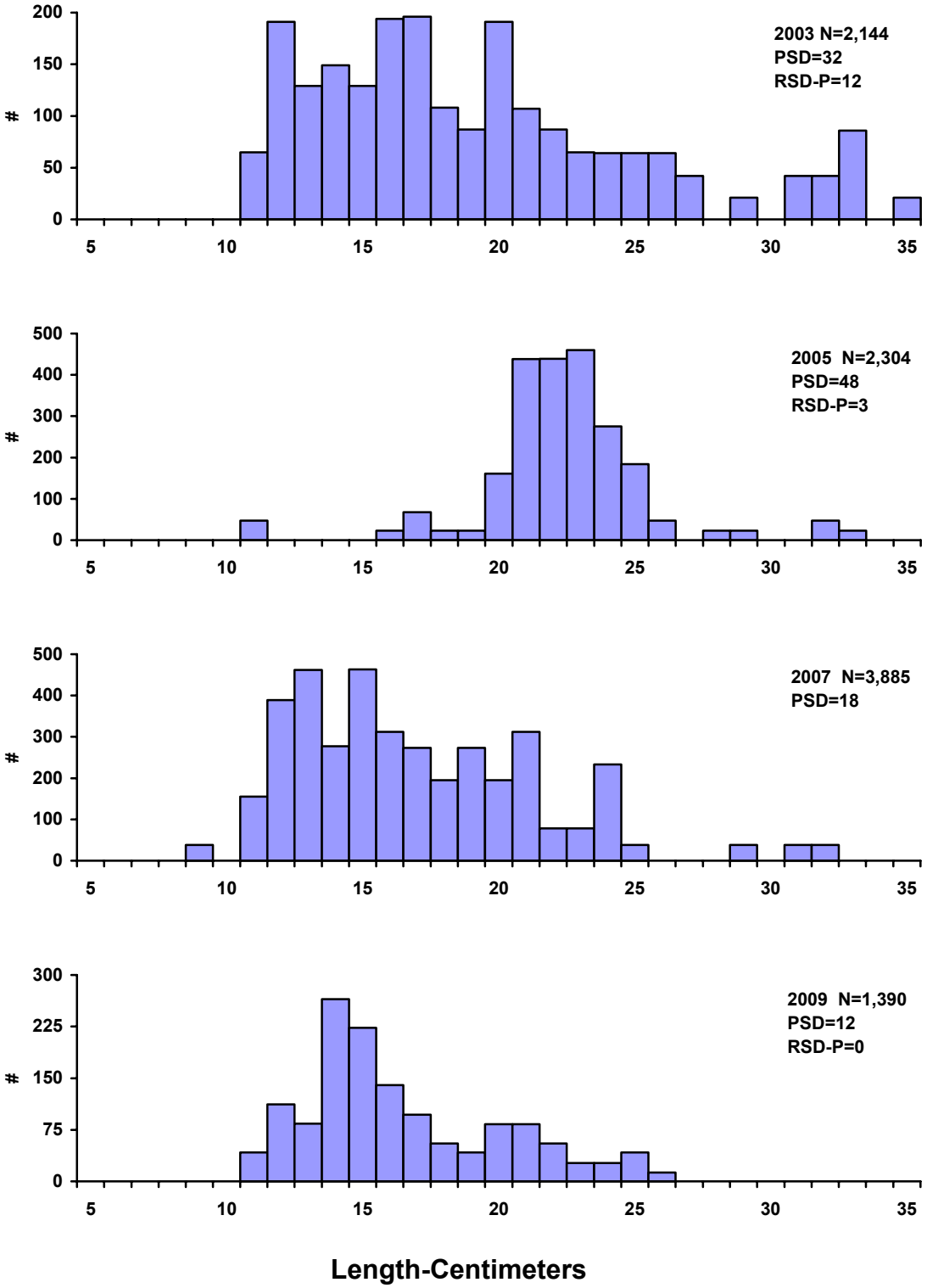

Figure 2. Length frequency histograms for black bullheads sampled with trap nets in North Island Lake, Minnehaha County, 2003, 2005, 2007, and 2009.

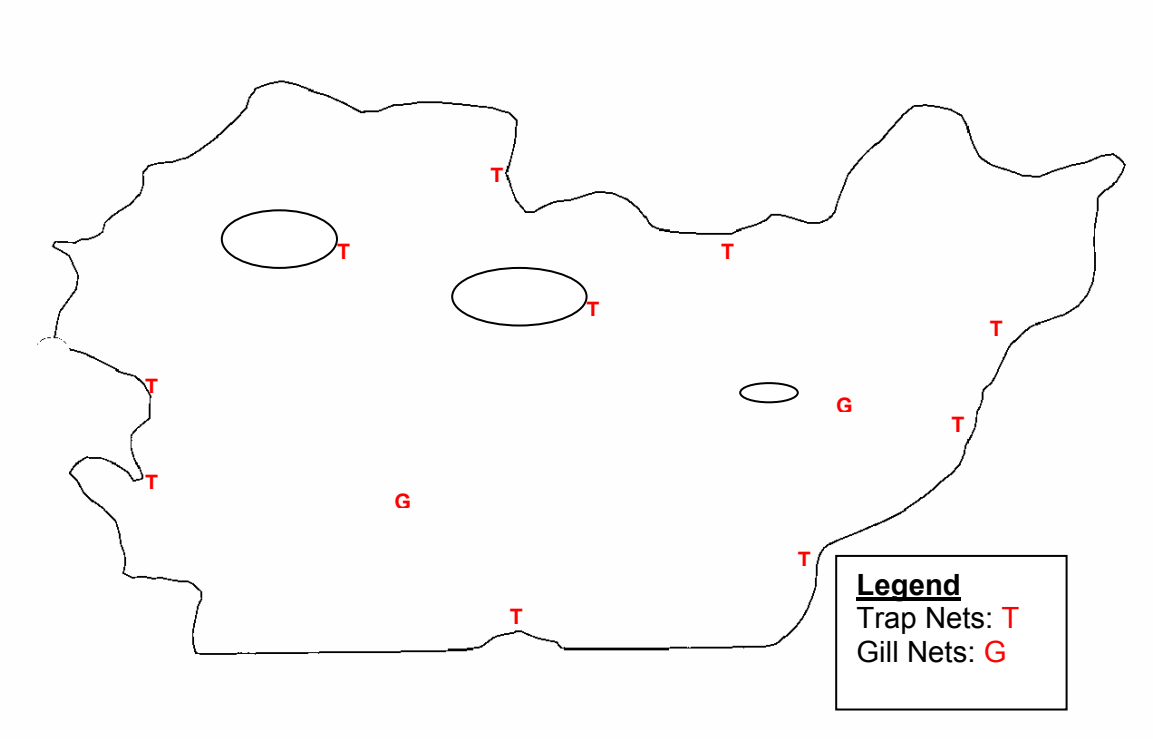

Figure 3. Sampling locations on North Island Lake, Minnehaha County, 2009.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.